REMARKS

After entry of this Amendment, claims 1-28 are pending in this application. Claims 1-8 and 10-14 have been amended to more particularly point out and distinctly claim the subject matter that the Applicant regards as the invention. Claims 15-28 have been added. Reconsideration of the application as amended is requested.

In response to a restriction requirement imposed by the Examiner, the applicant, on January 29, 2001, made provisional election with traverse to prosecute the product claims 1-7. The Applicant confirms the election with traverse to prosecute the claims 1-7, drawn to electric generators and motor structure, classified in class 310, subclass 91, identified as of Group I by the Examiner, pursuant to MPEP § 818.03(b). The claimed invention is related as process, product by process and product claims. Linking claims 23-24 have been added, linking together the claims of Group I and II as identified by the Examiner, pursuant to MPEP § 809.03. As indicated in MPEP § 809, linking claims 23-24 must be examined with the elected Group I claims. The Examiner's consideration of linking claims 23-24 is respectfully requested. Should the Examiner find that the linking claims 23-24 are allowable, the Group II claims identified by the Examiner as claims 8-13, must be rejoined with the product claims and be fully examined for patentability pursuant to MPEP § 809. New claims 15-18 and 25-28 correspond to the elected product claims of Group I. New claims 23-24 are linking claims. New claims 19-22 correspond to the process claims of Group II.

Claims 1-7 stand rejected under 35 U.S.C. § 112, 2nd paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that the applicant regards as the invention. The Examiner states that claims 1 and 6 recite "the output shaft" and that there is insufficient basis for this limitation in the claims. Claims 1 and 6 have been amended to remove the term "output" so that the term "shaft" has antecedent basis in the preamble of the respective claims. It is submitted that this amendment traverses the rejections of claims 1-7. Reconsideration of the Examiner's rejection is respectfully requested.

Claims 1 and 3 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the applicant's admitted prior art in view of Umezawa, et al. The Examiner states that the applicant's admitted prior art discloses the invention with the exception of the annular sleeve concentrically disposed about a tip end portion of the drive shaft and nominally spaced from the tip end portion. The Examiner states that Umezawa, et al. discloses an annular sleeve concentrically disposed about a tip end portion of a drive shaft and is nominally spaced from the tip end portion. The Examiner concludes that it would have been obvious at the time the invention was made to modify the motor/gear drive of the applicant's admitted prior art and provide it with the annular sleeve of Umezawa, et al. for the purpose of rotatably supporting a core shaft of the rotor core. Claim 1 has been amended to recite that the shaft is cantilevered, the annular sleeve is formed of plastic material and that the sleeve is operable to supportingly engage the outer diameter of the tip end portion of the shaft only in response to radial loads acting to deflect the shaft. It is submitted that the combination of the applicant's admitted prior art in view of Umezawa, et al. does not teach or suggest a cantilevered shaft in combination with a plastic annular sleeve operable to supportingly engage an outer diameter of the tip end portion of the cantilevered shaft only in response to radial loads acting to deflect the shaft into engagement with the sleeve. The bearing 6 of Umezawa, et al. is depicted in Figures 1-5 of the '256 patent as being metallic. The annular sleeve of the present invention, on the other hand, is plastic as is now recited in claim 1. In addition, the bearing 6 of Umezawa, et al. continuously engages the shaft 3b and therefore the shaft 3b is not cantilevered. The annular sleeve of the present invention engages the tip end portion of the cantilevered shaft only while the shaft is being deflected radially. In other words, the bearing 6 of Umezawa, et al. continuously supports the shaft to prevent radial deflection of the shaft 3b, while the annular sleeve of the present invention acts intermittently as a radial stop to limit an amount of radial deflection that occurs when the shaft experiences certain load conditions. It is submitted that this amendment traverses the rejection of claims 1 and 3. Reconsideration of the Examiner's rejection is respectfully requested.

Claim 2 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the applicant's admitted prior art, in view of Umezawa, et al., and further in view of McManus. The Examiner states that McManus discloses an injection molded sleeve and that it would have been obvious at the time the present invention was made to modify the motor/gear drive of the applicant's admitted prior art in view of Umezawa, et al. to provide it with the sleeve of McManus for the purpose of reducing weight and facilitating manufacturing of the motor. As discussed above, claim 1 has been amended to recite that the plastic annular sleeve supportingly engages the outer diameter of the tip end portion of the cantilevered shaft only in response to radial loads acting to deflect the cantilevered shaft. It is submitted that the combination of the applicant's admitted prior art in view of Umezawa, et al. does not teach or suggest a plastic annular sleeve operable to supportingly engage an outer diameter of the tip end portion of a cantilevered shaft only in response to radial loads acting to deflect the cantilevered shaft. The addition of McManus to the combination of applicant's admitted prior art and Umezawa, et al. does not overcome this deficiency. McManus, like Umezawa, et al., teaches a bearing 18 that continuously supports a shaft and prevents radial deflection of the shaft. McManus does not teach or suggest a cantilevered shaft and/or that the bearing 18 acts as a radial stop to limit radial deflection of a cantilevered shaft only after the cantilevered shaft has been radially deflected. None of the cited references, taken singularly or in any permissible combination, teach or suggest a plastic sleeve injection molded in situ within the bore of the housing as recited in amended claim 2. It is submitted that this amendment traverses the rejection of claim 2. Reconsideration of the Examiner's rejection is respectfully requested.

Claims 4 and 5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the applicant's admitted prior art in view of Umezawa, et al. and further in view of Mackay, et al. The Examiner states that the applicant's admitted prior art in view of Umezawa, et al. discloses the motor gear drive as described in claim 1 with the exception of a thrust member disposed in a bore of the housing. The Examiner states that it would have been obvious at the time the invention was made to modify the motor/gear drive of the applicant's admitted prior art in view of

Umezawa, et al. to provide the thrust member of Mackay, et al. for the purpose of controlling shaft end play. Claim 1 has been amended, as discussed above, to recite that the plastic annular sleeve supportingly engages the cantilevered shaft only in response to radial loads acting to deflect the cantilevered shaft. It is submitted that the combination of the applicant's admitted prior art in view of Umezawa, et al. does not teach or suggest a cantilevered shaft and/or a plastic annular sleeve operable to engage the tip end of the cantilevered shaft only in response to radial loads acting to deflect the cantilevered shaft. The addition of Mackay, et al. to the combination of the applicant's admitted prior art and Umezawa, et al. does not overcome this deficiency. In addition, claim 4 has been amended to recite that the thrust member is a plastic thrust member. It is submitted that the combination of the applicant's admitted prior art and Umezawa, et al. in view of Mackay, et al. does not teach or suggest a thrust member formed as a plastic thrust member. The insert 24 of Mackay, et al. is made from a brass material. U.S. Patent 5,485,044, column 3, line 39. In addition, claim 5 has been amended to recite that the thrust member is formed by injection molding in situ within the bore of the housing. None of the references, taken singularly or in any permissible combination, teach or suggest a plastic injection molded thrust member formed in situ within the bore of a housing. The insert 24 of Mackay, et al. is formed external to the housing and inserted in a tunnel 44 of the housing 14. It is submitted that this amendment traverses the rejection of claims 4 and 5. Reconsideration of the Examiner's rejection is respectfully requested.

Claims 6 and 7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the applicant's admitted prior art in view of Mackay, et al. The Examiner states that the applicant's admitted prior art discloses the invention with the exception of the thrust member disposed in the bore of the housing in coaxial registry with the end wall of the shaft and does not show the engagement of the thrust member with the end wall of the drive shaft to prevent axial movement of the drive shaft. The Examiner further states that Mackay, et al. discloses the thrust member for the purpose of controlling shaft end play and that it would have been obvious at the time of the invention was made to modify the motor/gear drive of the applicant's admitted prior art with the thrust member of Mackay, et al. for the purpose of

controlling shaft end play. Claim 6 has been amended to recite that the cantilevered shaft is engageable with a plastic thrust member within the bore of the housing to prevent axial movement. It is submitted that the combination of the applicant's admitted prior art with Mackay, et al. does not teach or suggest the invention as recited in claim 6. In particular, Mackay, et al. does not teach or suggest a plastic thrust member; the Mackay, et al. insert 24 is formed of a brass material. ('044 patent, column 3, line 39). With respect to claim 7, Mackay, et al. does not teach or suggest a plastic thrust member formed by injection molding in situ within a housing. The insert 24 of Mackay, et al. is formed external to the housing, inserted into a tunnel 44 of the housing 14, and joined to the housing 14 by ultrasonic welding. ('044 patent, column 4, lines 1-29). It is submitted that this amendment traverses the rejection of claims 6 and 7. Reconsideration of the Examiner's rejection is respectfully requested.

New claims 15-28 have been added in this Amendment. It is submitted that new claims 15-28 are patentable over the prior art of record for the same reasons as indicated in greater detail above. The grouping of new claims 15-28 for purposes of the election is stated in greater detail above. The Examiner's consideration of new claims 15-28 is requested.

It is respectfully submitted that this Amendment traverses and overcomes all of the Examiner's objections and rejections to the application as originally filed. It is further submitted that this Amendment has antecedent basis in the application as originally filed, including the specification, claims and drawings, and that this Amendment does not add any new subject matter to the application. Reconsideration of the application as amended is requested. It is respectfully submitted that this Amendment places the application in suitable condition for allowance; notice of which is requested.

If the Examiner feels that prosecution of the present application can be expedited by way of an Examiner's amendment, the Examiner is invited to contact the Applicant's attorney at the telephone number listed below.

Respectfully submitted,

YOUNG, BASILE, HANLON, MacFARLANE, WOOD & HELMHOLDT, P.C.

Thomas D. Helmholdt
Attorney for Applicant(s)
Registration No. 33181
(248) 649-3333

3001 West Big Beaver Rd., Suite 624
Troy, Michigan 48084-3107

Dated: June 15, 2001
TDH/RCM/p

VERSION OF AMENDMENTS WITH MARKINGS
TO SHOW CHANGES MADE

In the specification:

Replace the paragraph starting on page 3, line 24 and ending on page 3, line 29 with:

In another aspect of the invention, an injection molded thrust member is disposed in the bore in the housing in coaxial registry with the end wall of the shaft. The engagement of the [tubular] thrust member with the end wall of the output shaft prevents axial movement of the drive shaft.

Replace the paragraph starting on page 7, line 13 and ending on page 7, line 19 with:

Fig. 1 depicts only the motor shaft 10, with the drive motor itself not being shown. In this application, the motor and gear drive are mounted in two separate housings [12] with a housing 12, which is typically a cast housing, by example only, formed of a suitable metal, such as aluminum, depicted for the gear drive.

Replace the paragraph starting on page 8, line 1 and ending on page 8, line 5 with:

It will be understood that the worm wheel or worm which engages the worm gear 14 and is fixedly mounted on a drive shaft, [no] not shown in Fig. 1, is angularly offset, typically at 90° from the axis of the drive shaft 10.

Replace the paragraph starting on page 9, line 26 and ending on page 9, line 37 with:

As shown in Fig. 2, the housing 12 has a stepped bore 40 formed of a first larger diameter bore portion 42 and a second, coaxial smaller diameter bore portion 44, with both of the first and second bore portions 42 and 44 referred to hereafter simply as the first bore 42 and the second bore 44. A first gate or runner 46

is formed through the housing 12 and has an outlet disposed in fluid communication with the first bore 42 and an inlet opening externally [or] with respect to the housing 12. The first gate 46 is designed to provide a path for molten plastic, as described hereafter, during an injection molding process to flow into the first bore 42.

Replace the paragraphs starting on page 10, line 7 and ending on page 10, line 26 with:

The present method and apparatus make use of a mold core 50, shown in Fig. 3 which concentrically aligns, seals and forms an interior cavity for forming the sleeve 32 as described hereafter. The mold core 50 includes a shank 52 having a first diameter cylindrical end portion 54, an adjacent second, larger diameter cylindrical portion 56, an adjacent yet larger diameter cylindrical portion [58], and a final largest diameter portion 60.

The cylindrical portions 54, 56, [58,] and 60 serve various functions. Specifically, the first cylindrical portion 54 of the mold core 50 has an outer diameter just slightly smaller than the inner diameter of the second bore 44 in the housing 12 so as to fit therein. A first shoulder 62 is formed between the coplanar ends of the first and second cylindrical portions 54 and 56 of the mold core 50. The first shoulder 62 is designed to sealingly engage a face 64 formed between the first and second bores 42 and 44 in the housing 12.

Replace the paragraph starting on page 11, line 15 and ending on page 11, line 25 with:

A third shoulder 72 is formed intermediate along the shank 52 of the mold core 50 and is positioned to engage a third face 74 formed intermediately within the housing 12. The third face 74 is formed as one support wall of the outer bearing race 22 shown in Fig. 1. An enlarged annular flange 78 is formed on the mold core 50 and extends radially outward from an intermediate portion of the shank 52. The annular flange 78 is formed with an outer cylindrical mounting flange 76 which is adapted to engage a similar mounting flange [78, not shown,] on [the motor] a portion of the housing 12.

Replace the paragraph starting on page 11, line 33 and ending on page 12, line 11 with:

After the injected plastic cools to a hardened state forming the sleeve 32, the mold core 50 is removed as shown in Fig. 4. In the next method step of the present invention, the drive shaft 10 extending outward from the motor, not shown, is aligned with the interior bore 33 within the sleeve 32. The tip end portion 16 of the shaft 10 is then inserted into the bore 33 in the sleeve 32 as shown in Fig. 5. The tip end portion 16 seats against the first face 64 closing off the second bore 44 from the first bore 42 containing the sleeve 32. Molten plastic is then injected through the second gate 48 into the first bore 44 to form the thrust member 34, as shown in Figure 5. The thrust member 34 engages the end wall 18 of the tip end portion 16 of the shaft 10 to hold the shaft 10 from axial movement under any axial forces exerted on the shaft 10 during operation of the motor and gear.

In the claims:

1. (Amended) In a motor/gear drive [wherein a motor] having a cantilevered shaft [has] with a worm gear carried thereon and a free tip end portion with an outer diameter terminating in an end wall, and a [bore in a motor/gear] housing having a bore formed coaxial with respect to the [output] shaft to be installed therein, the improvement comprising:

[an] a plastic annular sleeve within the bore of the housing concentrically disposed to be positionable about the outer diameter of the [a] tip end portion of [a drive] the shaft to be installed and to be nominally spaced radially from the outer diameter of the tip end portion[;], and wherein the sleeve is operable to supportingly [engages] engage the outer diameter of the tip end portion of the [drive] shaft[, under] only in response to radial loads acting to deflect the [drive] shaft into contact with the annular sleeve.

2. (Amended) The improvement of claim 1 wherein the sleeve is an injection molded sleeve formed in situ within the bore of the housing.

3. (Amended) The improvement of claim 1 [wherein] further comprising:

the sleeve [has] having a bore extending therethrough, the bore having an inner diameter larger than the outer diameter of the tip end portion of the shaft to be installed.

4. (Amended) The improvement of claim 1 further comprising:

a plastic thrust member within the bore of the housing disposed [in the bore in the housing] to be in coaxial registry with the end wall of the shaft to be installed,[;] and [wherein the] operable to be in engagement [of the thrust member] with the end wall of the [drive] shaft to be installed to prevent [prevents] axial movement of the [drive] shaft.

5. (Amended) The improvement of claim 4 wherein[:] the thrust member is an injection molded thrust member formed in situ within the bore of the housing.

6. (Amended) In a motor/gear drive [wherein a motor] having a cantilevered shaft [has] with a worm gear carried thereon and a free tip end portion with an outer diameter terminating in an end wall, a [bore in a motor/gear] housing having a bore formed coaxial with respect to the [output] shaft to be installed therein, the improvement comprising:

a plastic thrust member within the bore of the housing disposed [in the bore in the housing] to be in coaxial registry with the end wall of the shaft to be installed,[;] and operable to be in [wherein the] engagement [of the thrust member] with the end wall of the [drive] shaft to be installed to prevent [prevents] axial movement of the [drive] shaft.

7. (Amended) The improvement of claim 6, wherein[:] the thrust member is an injection molded thrust member formed in situ within the bore of the housing.

8. (Amended) A method [of] for manufacturing a motor/gear drive [wherein the motor/gear drive has a drive] having a cantilevered shaft [carrying] with a worm gear carried thereon, and a free tip end portion with an outer diameter terminating in an end wall, and a housing having a bore formed coaxial with respect to the shaft to be installed therein, the method comprising the steps of:

[forming a bore in a motor/gear drive housing, the bore having a first bore portion of a first diameter and an axially endmost, coaxial, second bore portion of a smaller diameter;

forming a shoulder between the first and second bore portions;

forming a first gate in the housing communicating with the first bore portion;]

inserting a mold core into the bore of the housing, the mold core having a first end portion with a diameter larger than the outer diameter of the free tip end portion of the [drive] shaft and a second larger diameter portion with a shoulder formed between the first and second portions sealingly closing [the] a first [bore] portion of the bore in the housing, the first [bore] portion of the bore in the housing and the first end portion of the mold core forming an interior cavity therebetween;

injecting molten plastic into the interior cavity through [the] a first gate to form a sleeve having an inner diameter surface surrounding a hollow bore; and

removing the mold core.

10. (Amended) The method of claim 8 further comprising the steps of:

forming a first flange on the housing;

forming a second flange on the mold core; and

engaging the first and second flanges to align a longitudinal axis of the mold core with an axis extending through the first [bore] portion of the bore in the housing.

11. (Amended) The method of claim 8 further comprising the steps of:

forming a second gate in the housing communicating with [the] a second [bore] portion of the bore in the housing;

forming an end wall of the [drive] shaft with an outer diameter larger than the diameter of the second [bore] portion of the bore in the housing;

disposing the end wall of the [drive] shaft to sealingly close off an end of the second [bore] portion of the bore in the housing;

inserting the [drive] shaft [of the motor/gear drive] into the housing with the free tip end portion of the [drive] shaft extending through the first [bore] portion of the bore in the housing;

disposing the end wall of the [drive] shaft to sealing close the second [bore] portion of the bore in the housing; and

injecting molten plastic through the second gate into the second [bore] portion of the bore in the housing to form a thrust member in the second [bore] portion of the bore in the housing in registry with the end wall of the [drive] shaft.

12. (Amended) A method [of] for manufacturing a motor/gear drive [wherein the motor/gear drive has a drive] having a cantilevered shaft [carrying] with a worm gear carried thereon, and a free tip end portion with an outer diameter terminating in an end wall, a housing having a bore formed coaxial with respect to the shaft to be installed therein, the method comprising the steps of:

forming a [second] gate in the housing communicating with [the second bore] one portion of the bore in the housing;

forming [an] the end wall of the [drive] shaft with an outer diameter larger than the diameter of the [second bore] one portion of the bore in the housing;

disposing the end wall of the [drive] shaft to sealingly close off an end of the [second bore] one portion of the bore in the housing;

inserting the [drive] shaft [of the motor/gear drive] into the housing with the free tip end portion of the [drive] shaft extending through [the first bore] another portion of the bore in the housing;

disposing the end wall of the [drive] shaft to sealing close the [second bore] one portion of the bore in the housing; and

injecting molten plastic through the [second] gate into the [second bore] one portion of the bore in the housing to form a thrust member in the [second

bore] one portion of the bore in the housing in registry with the end wall of the [drive] shaft.

13. (Amended) A method [of] for manufacturing a motor/gear drive [wherein the motor/gear drive has a drive] having a cantilevered shaft [carrying] with a worm gear carried thereon, and a free tip end portion with an outer diameter terminating in an end wall, a housing having a bore formed coaxial with respect to the shaft to be installed therein, the method comprising the steps of:

forming [a bore in a motor/gear drive housing,] the bore of the housing having a first bore portion of a first diameter; and

injection molding a sleeve in the first bore portion, the sleeve having a through bore with an inner diameter larger than the outer diameter of a free tip end portion of the [motor/gear drive] shaft.

14. (Amended) A method [of] for manufacturing a motor/gear drive [wherein the motor/gear drive has a drive] having a cantilevered shaft with [carrying] a worm gear carried thereon, and a free tip end portion with an outer diameter terminating in an end wall, a housing having a bore formed coaxial with respect to the shaft to be installed therein, the method comprising the steps of:

forming [a bore in a motor/gear drive housing,] the bore of the housing for receiving [a] the free tip end portion of a [drive] shaft; and

injection molding a thrust member [in] within the bore of the housing in registry with the tip end portion of the [drive] installed shaft, the thrust member limiting axial movement of the [drive] installed shaft.

New claims 15-27 are submitted.